



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,400	06/23/2005	Joichiro Ezaki	123600	9720
25944	7590	07/27/2007		
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			EXAMINER YOHA, CONNIE C	
			ART UNIT 2827	PAPER NUMBER
			MAIL DATE 07/27/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/540,400

Applicant(s)

EZAKI ET AL.

Examiner

Connie C. Yoha

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 and 22 is/are allowed.
- 6) ☒ Claim(s) 1, 17, 19-20 is/are rejected.
- 7) ☒ Claim(s) 2-16, 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

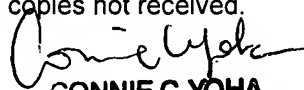
**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

  
**CONNIE C. YOHA**  
**PRIMARY EXAMINER**

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Arguments***

1. Examiner took notice of the remarks and amendments made by applicant filed on 5/2/07.

The terminal disclaimer filed 5/2/07 was considered.

2. A second non-final rejection is applied to the pending claims using newly cited reference.

### ***Response to Amendment***

3. This office action is in response to Amendment filed on 5/2/07.
4. Claims 1-22 is pending.

### **Claim Objection**

Claim 20 is objected to because of the following informalities: The limitation of "the first write line and the second write line" on line 5-6 of the claim contain antecedent basis problem. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Tsuji, Pat. No. 6618317.

With regard to claim 1, Tsuji discloses a magnetic memory device comprising: a plurality of magnetoresistive devices including a magnetic sensitive layer of which the magnetization direction changes according to an external magnetic field (col. 1, line 36-col. 2, line 35); a plurality of write lines (fig. 34, BL<0> - BL<n>) where a write current for generating an external magnetic field which is applied to the magnetic sensitive layer flows; a plurality of current direction control circuits (fig. 34, BLUa- BLUb) each of which is disposed for each write line (fig. 34, BL<0> - BL<n>) and has a function of controlling the direction of a write current in each write line according to an inputted write data signal (col. 3, line 62-col. 4, line 26); and a constant current circuit (col. 34, 600) being shared among the plurality of current direction control circuits (fig. 34, BLUa- BLUb) and making the write current flowing through each write line constant (col. 3, line 57-61).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji et al, Pat. No. 6618317 in view of Deak, Pat. No. 6885576.

With regard to claim 17, Tsuji, as applied in prior rejection, discloses all claimed subject matter including wherein the magnetoresistive device includes: a laminate which includes the magnetic sensitive layer (fig. 30, ferromagnetic material layer FL, VL) and through which a current flows in a direction perpendicular to a laminate surface (col. 1, line 56-col. 2, line 26). Tsuji, however, does not disclose a toroidal magnetic layer which is disposed on one surface of the laminate so that its direction along the laminate surface is its axial direction, and the write line passes through the toroidal magnetic layer. However, Deak disclose a magnetic random access memory (MRAM) of a closed flux structure having a toroidal magnetic layer (fig. 2, 126) which is disposed on one surface of the laminate (fig. 2, insulated layer laminate the toroidal magnetic layer 126 and the pinned layer 122) so that its direction along the laminate surface is its axial direction, and the write line (fig. 2, 128) passes through the toroidal magnetic layer (fig. 2, 126) (col. 3, line 51-55, col. 3, line 61-col. 4, line 1). Therefore, it would have been obvious for one having an ordinary skill in the art at the time the invention was made to incorporate the magnetic memory structure of Deak's into Tsuji's to store data, since such magnetic memory of a closed flux structure can be scaled to increase memory density.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2827

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji et al, Pat. No. 6618317 in view of Schwarzl et al, Pat. No. 6574138.

With regard to claim 19, Tsuji, as applied in prior rejection, discloses all claimed subject matter except wherein one memory cell includes a pair of the magnetoresistive devices (with regard to claim 19) and that the magnetization directions of magnetic sensitive layers in the pair of magnetoresistive devices change according to a magnetic field induced by a current flowing through the first write line and the second write line so as to be antiparallel to each other, thereby information is stored in the memory cell (with regard to claim 20). However, Schwarzl discloses memory cell configuration that has memory cells, each contain two magnetoresistive elements (fig. 1, memory cell MR11 having two magnetoresistive element FM1 and FM2) that store information independently (with regard to claim 19). Schwarz also discloses that the magnetization directions of magnetic sensitive layers in the pair of magnetoresistive devices change according to a magnetic field induced by a current flowing through the first write line and the second write line so as to be antiparallel to each other, thereby information is stored in the memory cell (col. 6, line 64-col. 7, line 4) (with regard to claim 20). Therefore, it would have been obvious for one having an ordinary skill in the art at the time the invention was made to incorporate the use Schwarzl's memory structure in Tsuji's to

store memory logic or data in the memory cell with the applied currents flowing through the write lines. Such memory cell configuration can be produced with a reduced space requirement. (col. 4, line 21-44), thus overall memory circuitry space would be saved.

***Allowable Subject Matter***

8. Claim 2-16, and 18 are objected as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not show the limitation of wherein each write line has a loop shape in which both ends of the write line are connected to the current direction control circuit.

The prior art of record also does not show the limitation of wherein the current direction control circuit includes in combination with other feature, a first and second differential switch pair, the first switch pair includes first and second current switch which are disposed corresponding to both ends of the write line, and operate to turn to switching states different from each other; the second differential switch pair including a third and fourth current switch which are disposed corresponding to the first and second current switch, respectively, and operate to turn to switching states different from each other.

The prior art of record also does not show the limitation of wherein the magnetoresistive device having in combination with other feature including, the write line includes a plurality of first write lines and a plurality of second write lines extending so as to intersect with the plurality of first write lines, and the first and second write lines

extend in parallel to each other in a region where the first and second write lines passes through the toroidal magnetic layer.

9. Claims 21-22 are allowed.

The prior art of record also does not show a write current drive circuit having in combination with other limitations, a magnetic memory device and plurality of loop-shaped write lines where a write current for generating an external magnetic field which is applied to the magnetic sensitive layer flows, the write current drive comprises: a pair of connection ends to which both ends of the write line are connected to the current direction control circuit, and a constant current circuit being shared among the plurality of current direction control circuits.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. Tsuchida (6882565), Smith et al (6847544) and Ooishi (6958928) disclose a magnetic memory device.

11. When responding to the office action, Applicants' are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

12. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned (see MPEP 710.02 (b)).



Art Unit: 2827

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to whose telephone number is (571) 272-1799. The examiner can normally be reached on Mon. - Fri. from 8:00 A.M. to 5:30 PM. The examiner's supervisor, Amir Zarabian, can be reached at (571) 272-1852. The fax phone number for this Group is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov> should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



C. Yoha

July 2007



Connie C. Yoha

Art Unit 2827

**CONNIE C. YOH  
PRIMARY EXAMINER**